

We Claim:

5 1. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane of formula (I)



(I)

10

in which

15 1 $\leq n \leq 8$,

165 0 $\leq m \leq 2$ for $n = 1$ or 2 ,

20 0 $\leq m \leq 4$ for $3 \leq n \leq 8$,

1 $\leq x \leq 12$,

25 0 $\leq y \leq 2$, and

where R_1 and R_2 are each independently fluorine, hydrogen, alkyl, fluoroalkyl or perfluoroalkyl,

25 and each substituent $(C_nF_{2n+1-m}H_m)$ and the number y of the substituents on phosphorus centers PF_{4-y} are each independently selected,

30 with the proviso that perfluoro-1,2-bis(diethyldifluorophosphorano)ethane is excluded.

- 15
- 20
- 25
- 30
2. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane according to claim 1, wherein $1 \leq n \leq 6$.
 3. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane according to claim 1, wherein $1 \leq n \leq 3$.
 4. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane according to claim 1 wherein $1 \leq x \leq 8$.
 5. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane according to claim 1 wherein $1 \leq x \leq 4$.
 6. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane according to claim 1 wherein $m = 0$.
 7. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane according to claim 1, wherein $y = 2$.
 8. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane according to claim 1, wherein R_1 and R_2 are fluorine.
 9. A process for the preparation of a fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane of formula (I)
- $$(I) \quad (C_nF_{2n+1-m}H_m)_yPF_{4-y}(CR_1R_2)_xPF_{4-y}(C_nF_{2n+1-m}H_m)_y$$

(I)

in which $1 \leq n \leq 8$, $0 \leq m \leq 2$ for $n = 1$ or 2 , $0 \leq m \leq 4$ for $3 \leq n \leq 8$,
 $1 \leq x \leq 12$, $0 \leq y \leq 2$, and

where R₁ and R₂ are each independently fluorine, hydrogen, alkyl, fluoroalkyl or perfluoroalkyl, and

and each substituent (C_nF_{2n+1-m}H_m) and the number Y of the substituents on the phosphorus centers PF_{4-y} are each independently selected,

said process comprising converting at least one α,ω-bis(alkylphosphino)alkane into at least one compound of formula (I) by electrolysis in hydrogen fluoride, and optionally purifying and/or isolating a compound of formula I.

- 10
10. The process according to Claim 9, comprising converting at least one compound of formula (II)



(II)

in which R¹ = H, Cl or F,

1 ≤ a ≤ 8,

b = 0, 1 or 2 and

1 ≤ c ≤ 12,

and/or at least one compound of formula (III)



(III)

30 in which R² = Cl or F,

1 ≤ a ≤ 8,

b = 0, 1 or 2 and

1 ≤ c ≤ 12,

and where ligands (C_aH_{2a+1}), and R¹ and R² in the compounds (II) and/or (III) are each independently selected,

5

into a compound of formula (I) by electrolysis in hydrogen fluoride, and optionally purifying and/or isolating a compound of formula (I).

10 11. The process according to claim 9, wherein electrolysis is carried out at a temperature from -20 to +40°C.

15

12. The process according to claim 9, wherein electrolysis is carried out at an excess pressure of from 0 to 3 bar above atmospheric pressure.

16

13. The process according to claim 9, wherein electrolysis is carried out at a voltage of from 4 to 8 volts.

20

14. The process according to claim 9, wherein electrolysis is carried out at a current density of from 0.2 to 5 A/dm².

25

15. The process according to claim 9, comprising purifying or isolating a compound of formula (I) by extraction, phase separation, distillation or by a combination thereof.

26

16. The process according to claim 9 wherein electrolysis is carried out using a positive electrode containing nickel.